



ECOFOCUS

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The science behind environmental solutions

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Paul Corbit Brown

Ken Fritz

CARY SCIENTISTS CALL FOR MORATORIUM ON MOUNTAINTOP MINING IN U.S.

by Lisa M. Dellwo

Three scientists associated with the Cary Institute are among a group of the nation's leading environmental scientists who are calling for a moratorium on mountaintop mining permits.

President William H. Schlesinger, President Emeritus Gene E. Likens, and Dr. Emily S. Bernhardt of Duke University are among the coauthors of a paper in *Science*, published on January 8, calling on the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers to stay all new mountaintop mining permits. Bernhardt's Ph.D. research was conducted at the Institute under the mentorship of Likens.

On January 7, Schlesinger and Bernhardt participated in a press conference at the National Press Club in Washington, D.C., in which 25 reporters were briefed on the paper. Extensive coverage resulted in media including the *New York Times*, *Washington Post*, the Associated Press, McClatchy Newspapers, National Public Radio, ABC News, and the Huffington Post.

The twelve scientists who authored the article based their recommendation on their analysis of the latest scientific

findings that document irreversible environmental effects and serious human health impacts from this form of surface mining.

In mountaintop mining, forests at the tops of mountains are cleared and stripped of topsoil, and explosives are used to break up rocks in order to access coal buried below. Much of this rock is pushed into adjacent valleys where it obliterates streams. Mountaintop mining with valley fills is widespread throughout eastern Kentucky, West Virginia, and southwestern Virginia.

The *Science* paper outlines the severe degradation taking place at mining sites and downstream, including the destruction of deciduous forests and burial of small streams that contribute to the health of large watersheds. Contaminants from the mines enter streams below the valley fills and are transported to larger bodies of water.

The authors also describe human health impacts associated with this mining practice, including elevated rates of mortality, lung cancer, and chronic heart, lung and kidney disease in coal-producing communities. Miners are typically men, but these diseases are prevalent in women

"Current attempts to regulate [this mining practice] are inadequate."

in surface mining regions as well, indicating that the effects are not just due to direct occupational exposure to mines.

Although mining companies are required to mitigate the impacts of this practice, there is ample evidence that mitigation practices are ineffective: reclaimed soils have low organic and nutrient content and are so compacted by heavy machinery that they do not drain well. Replanted vegetation does not grow back well. And streams below mining sites still carry high levels of toxic material.

The paper's authors say, "Clearly, current attempts to regulate [this mining practice] are inadequate. Mining permits are being issued despite the preponderance of scientific evidence that impacts are pervasive and irreversible and, that mitigation cannot compensate for losses."

They also express the urgency for the U.S. to take leadership on this issue, since "surface mining in many developing countries is expected to grow extensively in the next decade."

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ECOFOCUS

Ecofocus is published by the Cary Institute of Ecosystem Studies. Our scientists are leading efforts to understand human impacts on air and water quality, climate change, invasive species, and the ecological dimensions of infectious disease. As an independent, not-for-profit organization, the Cary Institute produces unbiased research that leads to more effective management and policy decisions.

PRESIDENT:
William H. Schlesinger, Ph.D.

WRITER & EDITOR:
Lori M. Quillen

Address newsletter correspondence to:
Communications Office
Cary Institute of Ecosystem Studies
Box AB
Millbrook, NY 12545
E-mail: QuillenL@caryinstitute.org

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FROM OUR PRESIDENT



John Halpern

You realize that the most effective policies will come when the best science informs the policy makers, and we strive to play that role every day.

Dear Friends of the Cary Institute:

It may be cold outside, but at the Cary Institute, winter is a time of bustling activity—grants to be renewed, summer data to be analyzed, and papers to be written.

In January, the halls of the Plant Science Building vibrated with youthful energy when graduate students from across the country participated in the intensive Fundamentals of Ecosystem Ecology course that our scientists offer annually. Within the next few weeks, we will submit major proposals to sustain our efforts in the Hubbard Brook Ecosystem Study in New Hampshire and for long-term ecological research in the Baltimore urban ecosystem.

This season, we also have a remarkable schedule of lectures for the public. Already, we've heard from leading climate scientist Dr. James E. Hansen on his efforts to make our policy makers believe in climate change. In the months ahead, our own Dr. Richard S. Ostfeld will speak on the role of biodiversity in protecting humans from Lyme disease and related illnesses.

And in the spring, Tyler Prize-winning scientist (and Millbrook School graduate) Dr. Thomas Lovejoy will give the inaugural Ned Ames Honorary Lecture.

The past year has been difficult for all non-profit organizations that seek a better future environment for all of Earth's citizens. We are grateful to all of you who have helped our cause and our endeavor. You realize that the most effective policies will come when the best science informs the policy makers, and we strive to play that role every day.

Thank you.

Dr. William H. Schlesinger, President

EDUCATION

POUGHKEEPSIE FIFTH-GRADERS BENEFIT FROM TEACHER'S TIES TO CARY INSTITUTE

by Lisa M. Dellwo

The Cary Institute's education and scientific staff reach almost 200 K-12 teachers every year, offering workshops and research experiences to help them strengthen curricula on ecology and environment. Some of the teachers remain in contact with the Institute, but none as much as Skip Hoover, a fifth-grade teacher at G. W. Krieger Elementary School in Poughkeepsie.

In 2008, Hoover was selected for a Research Experience for Teachers (RET) fellowship. This seven-week summer program, funded by the National Science Foundation, allows teachers to carry out scientific research under the mentorship of a professional scientist.

Hoover was assigned to work with aquatic ecologist Dr. Stuart Findlay, and together, they designed a study in which Hoover would measure the turbidity of tributaries of the Hudson River. Turbidity refers to the cloudiness or clarity of a body of water, and is affected by storms, the passage of boats, and other factors. Findlay says the project was ideal because the concept is easy to communicate to students, and because it is ecologically important, in that turbidity impedes light penetration and the particles that cause it can contain contaminants.

Partway into his summer program, Hoover realized that he didn't want to stop at seven weeks. So he arranged to extend his research into the 2008–2009 school year, engaging his fifth-graders in making measurements with equipment his RET grant allowed him to purchase. When he and his students presented their data at a Cary Institute gathering, Hoover announced that he intended to stay in touch with the Institute.

And he has. In summer 2009, he taught for several weeks at the Institute's Ecology Summer Camp, an experience that he says the RET fellowship qualified him for. This year, Hoover is working with Cary Institute educators Cornelia Harris and Kim Notin to develop a series of field



Cornelia Harris

Skip Hoover, a fifth-grade teacher at G. W. Krieger Elementary School in Poughkeepsie, and Cary Institute educator Kim Notin help students understand their local water cycle.

trips and class lessons focusing on the Poughkeepsie water cycle and the way humans have altered it.

He is also collaborating with Harris and Notin on a proposal for a Toyota Tapestry grant to fund an ambitious after-school program at Krieger: an Ecology Club for fifth-graders that would meet two times a week for discussion and hands-on field research focusing on the Hudson River watershed.

Although he has a master's degree in outdoor education, Hoover had never done field research before. The experience has enriched his classroom, he believes. "Now when I'm teaching science, I'm challenging my students to . . . ask questions and think deeply about the science that's going on. That's not so easy to do."

YOUNG ENVIRONMENTAL SCIENTISTS' CONFERENCE



On Thursday, April 22, Earth Day, students from all over Dutchess County will convene at the Cary Institute at 3 p.m. for the annual Young Environmental Scientists' (YES) Conference. Their environment-related science fair projects will be evaluated by Cary Institute scientists.

The conference will feature a public lecture at 4 p.m. by Dr. Tyrone Hayes, a U.C.-Berkeley scientist who studies how environmental pollutants affect amphibians.

For more information, call Cornelia Harris at 845-677-7600, ext. 321, or email harrisc@caryinstitute.org. More information about the conference is available online at www.caryinstitute.org/ed_yes_conference.html.

SPOTLIGHTS

STAFF NOTES



Senior Scientist Clive G. Jones has been on leave at AgroParisTech, part of the Paris Institute of Technology, where he has been working with the French government on the concepts and applications of ecological engineering.



President Emeritus and Distinguished Senior Scientist Gene E. Likens is editor-in-chief of the *Encyclopedia of Inland Waters*, a three-volume reference work published by Elsevier/Academic Press in 2009.



Distinguished Senior Scientist Steward T. A. Pickett has been elected president of the Ecological Society of America (ESA) for the 2011–2012 term. Pickett is on sabbatical this academic year serving as Martin Luther King Visiting Scholar at MIT's Department of Urban Studies and Planning, in the Environmental Policy and Planning subgroup.



Two additional Senior Scientists won ESA elections for the same term: Charles D. Canham as secretary and Peter M. Groffman as chair of the biogeosciences section.



President William H. Schlesinger has been elected a Fellow of the American Association for the Advancement of Science.



Associate Research Specialist Kirsten Schwarz successfully defended her Ph.D. dissertation on December 1, 2009, in the Rutgers University Graduate Program.



Senior Scientist Kathleen C. Weathers has been on leave at the National Science Foundation, where she is a program director in the Ecosystem Studies program.

NEW COLLABORATION WITH BARD COLLEGE

Under a new arrangement between the two institutions, Cary scientists will teach or co-teach courses on the Bard College campus, both in the undergraduate environmental and urban studies degree programs and as part of the masters degree programs offered by the Bard Center for Environmental Policy [BCEP]. The BCEP offerings include a new masters in climate science and policy that will launch in fall 2010.

These arrangements grew out of conversations between Cary Institute president William H. Schlesinger and Norton Batkin, dean of graduate studies at Bard, on strengthening bonds between the two institutions. Bard is a preeminent four-year liberal arts college in nearby Annandale-on-Hudson.



Don Hammerman

In addition, Bard students will have the opportunity to take a for-credit seminar course organized around the Institute's weekly public lecture series on its Millbrook campus. The collaboration will continue to offer students at Bard the opportunity to undertake internships and research assistantships in Cary Institute labs.

CARY INSTITUTE HOSTS WATERMAN BIRD CLUB LIBRARY

The 180-volume library of the Ralph T. Waterman Bird Club is now housed at the Cary Institute's library. The collection consists of guides to birding and bird behavior; field guides to birds, trees, wildflowers and wildlife, and photography and reference books relating to birds and nature. Some videotapes, CDs, and DVDs are included.

The Waterman Club, founded in 1958 and boasting about 350 members, conducts weekly bird walks throughout Dutchess County, including several annually on the Cary Institute grounds. Most of the books in its library were donated by members or purchased with club funds. Up until now, the library was hosted by a club member. The arrangement with the Cary Institute provides a permanent, central location for these materials.



A Yellow Warbler on the grounds of the Cary Institute.

Lisa M. Dellwo

WHERE WE WORK

ECOLOGY IN WINTER

by Lisa M. Dellwo

Winter is monochromatic and stark, the leafy trees of summer now skeletal shapes with the silhouettes of abandoned birds' nests revealed. Snow and ice dominate the landscape, periodically melting enough to expose black patches of mud. Behind the closed gates at the Cary Institute, it seems that all life has been suspended for the season.

But the cold, snow, and ice are hosting a variety of ecological processes that are paving the way for the coming spring and summer seasons.

On oaks, hickories, and other trees, the tissues that carry water up to the leaves freeze and thaw all winter, and as a result, air bubbles form that prevent the tree from "drinking." So in late winter, the trees will produce a new ring of wood to carry on this function in the warm seasons ahead.

While bears hibernate and chipmunks sleep through the coldest weather, there is ample evidence, in the form of tracks and scat, of other mammals and birds traveling the grounds throughout the winter. White-tailed deer, deprived of their leafy summer diet, are feasting on woody plants, and as a result, some saplings may not survive the season. Smaller herbivores like red-backed voles roam the forest floors, foraging for tiny evergreens.

Under a blanket of insulating snow, tiny microbes work all winter at decomposing the leaves that fell in the fall, transforming them into a nourishing natural compost that will drive next year's growth. Snow cover also protects tree roots, and if the winter doesn't produce much snow, the roots can be damaged during periods of freezing.

Soon the snow will melt, recharging the groundwater so that the trees' newly grown tissue can begin its work, bringing nourishment and water up the trunk to emerging leaves and buds.

Winter is doing its work, and spring is around the corner.

Senior Scientists Charles Canham and Peter Groffman contributed to this essay.



Barry Haydasz



Barry Haydasz

ENVIRONMENTAL MONITORING PROGRAM EXPANDED

The Cary Institute has added a carbon dioxide monitor to its array of environmental monitoring equipment. The instrument will work around the clock to measure the concentration of atmospheric CO₂, one of the key greenhouse gases responsible for climate change. The data will be available online to researchers interested in regional atmospheric changes.

Additionally, the Institute has joined the national Ammonia Monitoring Network, gathering data on gaseous ammonia from a new device and providing it to a nationwide dataset. This information will help scientists better understand the source of pollutants affecting the acidity in rain and the deposition of excess nitrogen in forest ecosystems.

These new devices join a robust environmental monitoring array at the Institute, in which meteorological and chemical data are collected and shared with researchers from around the world.



Pamela Freeman

Ammonia data gathered from this new device are provided to a national dataset.

SUPPORTERS' CORNER

ALDO LEOPOLD SOCIETY AUTUMN GLORY CELEBRATION

Over 100 members of the Aldo Leopold Society and their guests gathered in mid-October at Black Sheep Hill, the new Pine Plains home of trustee Irene Banning and her family, for an evening of cocktails and conversation about the Cary Institute.



Above left: Jack Banning and Karen Klopp. Above right: trustees Allan Shope and Irene Banning. Left: Cary Institute director of development Olivia van Melle Kamp; aquatic ecologist Emma Rosi-Marshall, who gave an informal presentation on her research; and Mary Moeller.

CARY ECOLOGY FESTIVAL SET FOR MAY 22, 2010

The Cary Institute will host a daylong ecology festival on Saturday, May 22. Plans are still underway, but the festival will include a series of scientist-led walks and demonstrations, including:

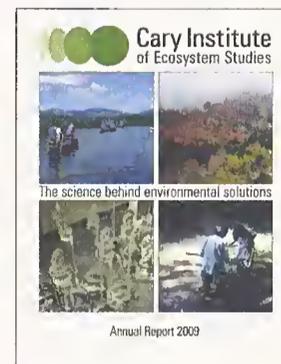
- a walk in the forest with tree core sampling
- visits to vernal pools, lowland streams, and the Fern Glen with scientists discussing the ecology of each area
- a tour of the environmental monitoring station, where instruments measure rainfall, wind, sunlight, and atmospheric chemistry
- family-friendly outdoor explorations led by our educators
- outdoor discussions of soils and worms and effects of deer exclosures.

"Our goal is to provide a day of fun for the public where we can demystify what we do at the Cary Institute," says director of development Olivia van Melle Kamp.

As the lineup of activities is finalized, more information will be posted online at www.caryinstitute.org.

ANNUAL REPORT NOW AVAILABLE

The Cary Institute's 2009 Annual Report is now available online and in print. To conserve resources, we encourage those interested in reading the annual report to do so online, at www.caryinstitute.org/annual_report.html.



Those who would like a printed copy can request one by phone or e-mail from Vicki Doyle: doylev@caryinstitute.org or 845-677-7600, ext. 203.

CALENDAR

Upcoming Public Programs

The events below will begin at our auditorium, located at 2801 Sharon Tpk. (Rte. 44) in Millbrook, NY. For more information, visit us online or call (845) 677-7600 x121.

Sunday, February 21st at noon

Winter Ecology Walk

This family-friendly afternoon of exploration, led by our educators, will introduce visitors to the ecology of winter. Discover animal tracks, plant adaptations, cold-weather insects, ice formations, and the wonders of winter survival. A winter craft will be offered. Please RSVP to ensure we have enough supplies. Call 677-7600 x121 or e-mail freemanp@caryinstitute.org. The inclement weather date will be February 28th.

Friday, March 5th at 7 p.m.

Biodiversity and Human Health

Join Cary Institute disease ecologist Dr. Richard S. Ostfeld for a lecture exploring the role that biodiversity plays in protecting human health. Using Lyme disease and West Nile virus as models, Ostfeld will describe how diverse animal populations minimize our exposure to emerging infectious disease.

Scientific Seminar Series

Free and open to the public, our scientific seminars are held on Thursdays at 11 a.m. in the Cary Institute's auditorium. A sampling of offerings is below; a complete list is available online at www.caryinstitute.org.

February 18: The Spatial Distribution of Lead in Urban Residential Soils of Baltimore, Maryland, Dr. Kirsten Schwarz, Cary Institute of Ecosystem Studies

February 25: Animal Migration and Infectious Disease Dynamics: Large-Scale Interactions Between Monarch Butterflies and a Protozoan Parasite, Dr. Sonia Altizer, University of Georgia

March 4: Ecology Disrupted: A Framework for Bringing Scientific Research on Human Environmental Impact to Secondary School Classrooms, Dr. Yael Wyner, City University of New York

March 11: Soil Microbial Community Effects on Ecosystem Carbon Dynamics, Dr. Mark Bradford, Yale School of Forestry and Environmental Studies

March 18: Ecological Connectivity in a Changing World: From Site-Based Science to the Continent, Dr. Debra Peters, USDA ARS, Jornada Experimental Range

March 25: Regional Spatial Modeling of Topsoil Geochemistry, Dr. Catherine Calder, Ohio State University

April 8: Interactions Among Dissolved Organic Matter, Microbial Diversity, and Nitrogen Cycling in an Agricultural Stream, Dr. Todd Royer, Indiana University

April 15: Effects of Climate Change and Local Environmental Variation on Plant Populations, Dr. Andrew Latimer, University of California Davis

April 22: From Silent Spring to Silent Night: A Tale of Toads and Men, Dr. Tyrone Hayes, University of California, Berkeley. This talk will take place at 4 p.m.

Ways to Support the Cary Institute

The Cary Institute offers two membership levels. **General members** receive an *Ecofocus* subscription and e-mail notification when we hold open lectures and events. **Aldo Leopold Society Members** are a special part of the Cary Institute family. Exclusive privileges include access to invitation-only lectures, receptions, and science updates.

General Membership

- \$50 Individual
 \$60 Family
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 \$250 Club/School

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For those who want to invest in understanding the natural world.

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Cary Institute
of Ecosystem Studies

Cary Institute Main Campus
Box AB (2801 Sharon Turnpike)
Millbrook, NY 12545
Tel: (845) 677-5343 • Fax: (845) 677-5976

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A WILD SOLUTION FOR CLIMATE CHANGE

THOMAS E. LOVEJOY, PH.D.

H. JOHN HEINZ III CENTER FOR SCIENCE, ECONOMICS AND THE ENVIRONMENT



Join us for the inaugural Ned Ames Honorary Lecture on Thursday, April 29th at 7:00 p.m.

The annual lecture series, honoring former trustee of the Mary Flagler Cary Charitable Trust Ned Ames, will feature renowned scientists delivering noteworthy lectures on environmental problems and solutions.

Dr. Thomas E. Lovejoy is an internationally known ecologist who coined the term “biological diversity” and founded the popular PBS program *Nature*. In 2001, he was awarded the prestigious Tyler Prize for Environmental Achievement.

The lecture will be held in the Cary Institute Auditorium.
Free and open to the public.